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September 6, 2000

Mr. M.M. Underwood, Jr.
Director of Physical Resources
U.S. Forest Service - Rocky Mountain Region
P.O. Box 25127
Lakewood, CO 80225-0127

Dear Mr. Underwood:

This is in response to your June 1, 2000 request for information on locatable mineral resources in a land exchange proposal in which Western Land Group, as managing agent for the Vassar Meadows Land Exchange Proponents (which include the Town of Avon, the Town of Minturn, Eagle River Water and Sanitation District, Eagle-Vail Metropolitan District, Sonnenalp Resort, Bail Associates, Inc., and Norrie Colony Homeowners Association) has offered certain non-Federal lands within the White River National Forest in exchange for Federal lands also within the White River National Forest.

In accordance with the working agreement under Public Law 86-509, we are providing you with a report on the locatable mineral resources on the lands described in "Exhibits A and B", included with your request. This effort included site visits to all the parcels with the exception of Parcel E on August 31 and September 1, 2000 with J.S. (Rusty) Dersch of the U.S. Forest Service. These lands comprise more than 1257 acres in Eagle and Pitkin Counties, Colorado.

Sincerely yours,

Anna B. Wilson, Geologist
Mineral Resources Program, Central Region

Copies: W.C. Day
E.A. duBray
N. Hollenkamp
J.S. Dersch

LOCATABLE MINERAL REPORT FOR THE VASSAR MEADOWS LAND EXCHANGE OFFER, WHITE RIVER NATIONAL FOREST, EAGLE AND PITKIN COUNTIES, COLORADO

By
Anna B. Wilson
U.S. Geological Survey

September 7, 2000

The following report is based on information contained in USGS mineral resource and commodity files, mineral information databases (MRDS and MAS), and on reports and maps available in the USGS library. These data are occasionally augmented with unpublished documents, personal communications, and professional experiences. No field studies or on-site visits were performed in preparing this report. Emphasis is primarily on locatable mineral resources. Leasable and salable resources are covered only if they appear in the above documents. Mineral resource assessments are subjective: the opinions expressed herein are entirely those of the author.

For the legal location description of lands considered for exchange, refer to Attachments A and B. A generalized geologic map is provided in Attachment C. Locations of individual parcels are shown on Attachments D-J.

Non-Federal

Parcel A "Vassar Meadows/East Brush Creek" (Attachment D)
Fulford 1:24,000, Vail 1:100,000, Leadville 1:250, 000 quadrangles

Parcel A is mapped as Pleistocene (Bull Lake and younger) unconsolidated glacial drift overlying Lower Triassic and Permian State Bridge Formation (Attachment C) near the southeastern end of the downthrown, fault bounded Hardscrabble Mountain block (Tweto and others, 1978). The lower elevations of the parcel are riparian wetlands in Quaternary alluvium. The sides of the valley are underlain by State Bridge Formation and overlain with colluvium, at least on the east side. There may be additional geologic mapping in the vicinity that could be consulted, such as Hubert (1954), Gableman (1949, 1950), Lueck (1970), and Richards (1982).

Parcel A is two to three miles west of the Polar Star and Johnson mines and the Fulford and Brush Creek mining areas (Gableman, 1949, 1950; Lueck, 1970; Richards, 1982). No mineral resource potential was assigned to this area (Toth and others, 1993).

Parcel B "Eagle-Vail Metropolitan District Parcel" (Attachment E)
Minturn and Grouse Mtn 1:24,000, Vail 1:100,000, Leadville 1:250, 000 quadrangles

Parcel B appears to be underlain by transitional rocks between Pennsylvanian Minturn Formation and Eagle Valley Evaporite. It is mapped as Pennsylvanian Minturn Formation, locally overlain by Holocene and Pleistocene landslide and colluvium (Tweto and Lovering, 1977) on the Minturn quadrangle, and presumably extends into similar rocks on the Grouse Mountain quadrangle. However, on the Leadville 1^{o} X 2^{o} quadrangle, this area is mapped as Permian Eagle Valley Evaporite (Tweto and others, 1978; Attachment C).

If Parcel B is underlain by Eagle Valley Evaporite, there may be moderate potential for small bedded gypsum deposits (Toth and others, 1993). However, the gypsum exposed 400 feet in elevation lower on the same hillside was very thin bedded (less than 1 inch) and impure.

Parcel C "Town of Minturn" (Attachment F)
Minturn 1:24,000, Vail 1:100,000, Leadville 1:250, 000 quadrangles

Parcel C is on the steep southwest-facing hillside on the northeast side of Minturn and the Eagle River. Middle Pennsylvanian Minturn Formation is exposed on the upper slopes and Lower Missippian Leadville Limestone (or Dolomite) is exposed at the base of the hillside along the railroad tracks. Middle elevations are covered with Pleistocene and Holocene landslide material and thick colluvium (Tweto and Lovering, 1977). Tweto and others (1978), at 1:250,000 scale, show this area as being in Quaternary deposits overlying Mississippian and Devonian rocks (Attachment C).

Parcel C is on the margin of areas assigned high potential for high-calcium limestone and moderate potential for large bedded replacement deposits containing Au, Ag, Cu, Pb, and Zn, primarily in Leadville Limestone (Toth and others, 1993). On a site-specific scale, resource potential is negligible.

Parcel D "Norrie Parcels" (Attachment G)
Meredith 1:24,000, Leadville 1:100,000, Leadville 1:250, 000 quadrangles

Parcel D, uphill from and adjacent to Parcel F-6, is in unconsolidated Pleistocene (Bull Lake and younger) glacial drift overlying Proterozoic X biotitic gneisses and migmatite (Tweto and others, 1978; Attachment C). Pegmatite lenses are exposed in the roadcut along Highway 105. This area was not assigned potential for any mineral deposits (Toth and others, 1993). Any aggregate would be of poor quality.

Parcel E "Mid-Continent Coal Prep Plant" (Attachment H)
Placita 1:24,000, Leadville 1:100,000, Leadville 1:250, 000 quadrangles

Parcel E is entirely within upper part of the Upper Cretaceous Mancos Shale in the center of the Coal Basin anticline (Tweto and others, 1978; Attachment C). Productive coal mines in the vicinity include Coal Basin, L.S. Wood, Dutch Creek No. 3, Dutch Creek No. 3, and Bear Creek (Brown, 1990a, b). Toth and others (1993) assigned this area high potential for coal and coalbed methane.

Federal

F-1 "West Avon" (Attachment I)
Eagle 1:24,000, Vail 1:100,000, Leadville 1:250, 000 quadrangles

Parcel F-1 is mapped as Pennsylvanian Eagle Valley Formation in the southwest and Eagle Valley Evaporite in the northeast. Locally, it is overlain by unconsolidated Pleistocene (Bull Lake and younger) stream terrace and outwash gravels (Tweto and others, 1978; Attachment C). Slopes are steep, and if the condition of the ubiquitous retaining walls are any indication, unstable. Instability of the slopes, however, has not visibly deterred development of large vacation homes on adjacent land.

Toth and others (1993) assigned the area underlain by Eagle Valley Evaporite moderate potential for small bedded gypsum deposits. There is no other mineral resource potential.

F-2 "Town of Minturn Public Works Facility" (Attachment F)
Minturn 1:24,000, Vail 1:100,000, Leadville 1:250, 000 quadrangles

Parcel F-2 is entirely in Pleistocene (Pinedale age) glacial drift (Tweto and Lovering, 1977). Toth and others (1993) assigned this area moderate potential for large replacement deposits of Au, Ag, Cu, Pb, and Zn. Such deposits, if present, would be at depth beneath the glacial deposits. The parcel plots at the edge of an area outlined as having low potential for small gold placer deposits in Cross Creek (Toth and others, 1993). This parcel should be evaluated for sand and gravel and aggregate potential.

F-3 "Eagle-Vail Golf Course" (Attachment E)
Minturn and Grouse Mtn 1:24,000, Vail 1:100,000, Leadville 1:250, 000 quadrangles

Parcel F-3 is in three tracts, the westernmost which hosts the 10th tee and hole of the Eagle-Vail Golf Course, the middle which hosts the 13th tee and hole, and the easternmost which hosts a popular hiking and mountain bike trail. The eastern and middle tracts are in an area mapped at 1:24,000 scale as Pennsylvanian Minturn Formation, locally overlain by Holocene and Pleistocene landslide and colluvium (Tweto and Lovering, 1977). The westernmost tract (on Grouse Mountain quad.) may be underlain by Pennsylvanian Eagle Valley Evaporite (Tweto and others, 1978; Attachment C), but no detailed geologic maps were available (Bob Scott, USGS, personal commun., 8/26/00). Tweto and others, at 1:250,000 scale, (1978) shows all three tracts in the area underlain by Eagle Valley Evaporite.

A site visit to ascertain the map units was inconclusive. Thin, 1 in thick, layers of gypsum interlayered with medium gray shale are exposed in the outcrop above the 10th pro tee. Such rock units could occur in the transitional facies in either the Minturn or Eagle Valley Formations. None of the parcels appeared to be underlain by more extensive evaporite beds. If any tracts are underlain by Eagle Valley Evaporite, there is moderate potential for small bedded gypsum deposits (Toth and others, 1993).

F-4 "Sonnenalp Golf Course" (Attachment I)
Eagle 1:24,000, Vail 1:100,000, Leadville 1:250, 000 quadrangles

Parcel F-4 is on the steep hillside at the northeast edge of the Sonnenalp Golf Course. It is underlain by Pennsylvanian Eagle Valley Formation on the upper slopes and Eagle Valley Evaporite (Tweto and others, 1978; Attachment C) on the lower slopes. The area surrounding the parcel is heavily developed in spite of indications of unstable slopes such as bulging and leaning retaining walls, and cracked and buckled driveways and patios. The area is on the margin of the area assigned moderate potential for small bedded gypsum deposits (Toth and others, 1993) in the Eagle Valley Evaporite.

F-5 “Beard Creek Water Tank” (Attachment J)
Edwards 1:24,000, Vail 1:100,000, Leadville 1:250, 000 quadrangles

Parcel F-5 is mapped as Pennsylvanian Eagle Valley Formation (Tweto and others, 1978; Attachment C). No resource potential was assigned to this area by Toth and others (1993). Access to the forest has been cut off by local landowners.

F-6 “Norrie Colony” (Attachment G)
Meredith 1:24,000, Leadville 1:100,000, Leadville 1:250, 000 quadrangles

Parcel F-6, adjacent to Parcel D, is in unconsolidated Pleistocene (Bull Lake and younger) glacial drift overlying Proterozoic X biotitic gneisses and migmatite (Tweto and others, 1978; Attachment C). The parcel is in two slivers below Highway 105. This area was not assigned potential for any mineral deposits (Toth and others, 1993).

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U.S. Geological Survey, 1999a, Mineral Resource Data System [MRDS: active computer file; data available from U.S. Geological Survey, Mineral Resources Program, Building 20, Denver Federal Center, Denver CO 80225].

U.S. Geological Survey, 1999b, Minerals Availability System [MAS: active computer file; data available from U.S. Geological Survey, Minerals Information Team (formerly U.S. Bureau of Mines), Building 20, Denver Federal Center, Denver CO 80225].

LIST OF ATTACHMENTS:

A. Exhibit A. Property that the Non-Federal party will consider exchanging (provided by U.S. Forest Service)

B. Exhibit B. Property that the U.S. Forest Service will consider exchanging (provided by USFS)

C. Geologic map of a portion of the Leadville quadrangle showing the location and general geology of each parcel (modified from Day and others, 1999),

D. Location of Non-Federal Parcel A, Vassar Meadows/East Brush Creek (provided by USFS)

E. Location of Non-Federal Parcel B, Eagle-Vail Metro District, and Federal Parcel F-3, Eagle-Vail Golf Course (provided by USFS)

F. Location of Non-Federal Parcel C, Town of Minturn, and Federal Parcel F-2, Town of Minturn Public Works (provided by USFS)

G. Location of Non-Federal Parcel D, Norrie Parcel, and Federal Parcel F-6, Norrie Colony (provided by USFS)

H. Location of Non-Federal Parcel E, Mid-Continent Coal Prep. Plant (provided by USFS)

I. Location of Federal Parcel F-1, West Avon, and Federal Parcel F-4, Sonnenalp Golf Course (provided by USFS)

J. Location of Federal Parcel F-5, Beard Creek Water Tank (provided by USFS)